REMARKS

The Examiner is thanked for courtesies extended in granting an interview in the above captioned application to Dr. James Baker and the undersigned on April 14, 2005. During this interview, the history of advances in toner technology, particularly in the use of amphipathic copolymers in toners in the past and in currently pending patent applications, was discussed. The differences between copolymers prepared in aqueous media either as a suspension or emulsion polymerization reactions and amphipathic copolymers prepared in solvents as described in the present application were also discussed. The different development stages and toner discoveries for use in different printing processes were also discussed. Early systems were described having toner particles with very low Tg polymers that were imaged and adhesively transferred by an adhesive overlaminate sheet. Liquid toners, including gels, were also discussed that comprised mid-range Tg toner particles that were formed a film on the photoreceptor and transferred as a film and subsequently fused to a substrate. Phase change developer systems were also discussed, wherein a toner is provided in a system that is solid at room temperature, but which is converted to a liquid toner, for example by heating, prior to imaging. The imaging process in the phase change developer system thus is a liquid toner system.
Issues related to creation of dry toner particles from toner particles prepared in liquids, and issues related to printing from liquid toner compositions without film formation on the photoreceptor were also discussed.

Amendments

Claims 1 and 22 have been amended to insert language regarding the S and D material portions of the amphipathic copolymer. Antecedent basis for this amendment is located in the specification at page 12, lines 12-16.

The specification has also been amended to update pending application status information.

It is respectfully submitted that no new matter is introduced by these amendments.

Claim Rejections

Claims 1 and 22 have been rejected under 35 USC 112, second paragraph as being indefinite.

More specifically, claims 1 and 22 have been stated to be indefinite in the terms S and D. These claims have been amended to relate these terms to the carrier liquid.

Claims 1-26 have been rejected under 35 USC 103 as being unpatentable over Baker 6,649,316 in view of Fujiwara 5,843,613 and Morrison 2003/0134940.

The present claims relate to gel liquid electrophotographic toner compositions comprising a liquid carrier and toner particles dispersed in the liquid carrier. The liquid carrier has a Kauri-butanol number less than 30 mL. The toner particles comprise a polymeric binder comprising at least one amphipathic copolymer with one or more S material portions and one or more D material portions. The toner composition comprises acidic and basic functionality in an amount sufficient to provide a three dimensional gel of controlled rigidity which can be reversibly reduced to a fluid state by application of energy. The electrophotographic toner composition does not form a film under Photoreceptor Image Formation conditions.

Gel toner compositions that do not substantially form a film under Photoreceptor Image Formation conditions provide specific advantages, including excellent image transfer from the photoreceptor, with low or no back transfer of the image to the photoreceptor during the printing process. Additionally, the gel toner compositions exhibit exceptional storage stability without the need to incorporate dispersant, surfactant, or stabilizer additives in an amount deleterious to image quality, although these additional components can be used if desired. Superior final image properties are also observed relative to erasure resistance and blocking resistance. The gels impart useful properties to the liquid ink, notably improved sedimentation stability of the colorant, without compromising print quality or ink transfer performance. The inks formulated with the gels also exhibit improved redispersion characteristics upon settling, and do not form dilatant sediments such as those formed by non-gelled organosol inks.

Baker 6,649,316 describes a phase change developer comprising: (a) a carrier having a Kauri-butanol number less than 30; and (b) an organosol comprising a graft (co)polymeric steric stabilizer covalently bonded to a thermoplastic (co)polymeric core that is insoluble in said carrier, and said (co)polymeric steric stabilizer comprises a crystallizing polymeric moiety that

independently and reversibly crystallizes at or above 30°C, wherein said phase change developer has a melting point at or above 22°C.

As noted in the Baker '316 specification beginning at column 11, line 52, the term "phase change developer" has an accepted meaning within the imaging art. As the term indicates, the developer system is present as one physical phase under storage conditions (e.g., usually a solid) and transitions into another phase during development (usually a liquid phase), usually under the influence of heat or other directed energy sources. Thus, in the system as described in Baker '316, the toner is converted from a solid form to a liquid form prior to development, so that the toner as described first is in the solid form, and then through a specific manipulation is converted to liquid form under image formation conditions so that the actual image formation process is carried out in the form of a liquid. See column 2, lines 21-25. This solid form is fundamentally different in nature from a gel created by molecular weight and solubility properties as required in the present claims.

Baker '316 therefore does not teach or suggest a gel toner composition comprising a gel created by utilizing acidic and basic functionality in an amount sufficient to provide a three dimensional gel of controlled rigidity which can be reversibly reduced to a fluid state by application of energy as presently claimed.

Additionally, Baker '316 describes a toner system wherein the toner is designed to form an image on the surface of a photoconductor with film formation on the photoconductor, which formed film is then transferred to an intermediate transfer material or directly to a print medium. See, e.g. Column 14, lines 64-65, which describes the drying of the film on the photoconductive element surface. This image formation system is in contrast to the presently claimed system, which specifically requires that the electrophotographic toner composition does not form a film under Photoreceptor Image Formation conditions.

Fujiwara describes a liquid developer for electrophotography comprising carrier liquid, and toner particles, dispersed in the carrier liquid, formed of binder resin and colorant, wherein said carrier liquid contains acidic dispersion resin and basic dispersion resin which are soluble in said carrier liquid. See the Abstract. This configuration is provided to improve developing speed by improving toner particle charging characteristics by adhering basic dispersion resin sufficiently on the toner particle surface, and also to improve the charge neutralization-induced reduction in toner particle migration speed by decreasing the frequency of collision between the

toner particles and basic dispersion resin by the combined use of the acidic dispersion resin in the carrier liquid. See column 3, lines 28-35.

The Fujiwara reference teaches away from use of a gel at column 6, lines 53-56, which state:

> When the amount of added dispersion resin is excessive, the viscosity of the liquid becomes higher, which makes it difficult for the toner particles to move within the liquid.

Thus, one would not have been motivated to modify Baker by using acidic and basic functionality in an amount sufficient to provide a three dimensional gel of controlled rigidity by Fujiwara. Fujiwara is concerned with providing the desired reduction in impact of toner particles and counter ion particles (column 2, liense47-50) through use of described functional groups, and specifically teaches away from forming a gel. In view of the teaching of Fujiwara, there would have been no motivation to combine these references to provide a toner composition as presently claimed.

Morrison discloses a liquid ink that utilizes a grafted copolymer having at least one acid group or basic group, together with a dispersant having an amine group when the copolymer has an acid group, and an acid group when the copolymer has a basic group. See paragraphs 0012 and 0013. This arrangement provides improved dispersion stability and chargeability . Morrison, however, only contemplates liquid inks, and does not teach or suggest gel toner compositions as presently claimed. Thus, as above, there would have been no motivation to combine these references to provide a toner composition as presently claimed.

Additionally, the liquid inks of Morrison, like Baker, are designed to form an image on the surface of a photoconductor with film formation on the photoconductor, which formed film is then transferred to an intermediate transfer material or directly to a print medium. See paragraph 0069, which expressly states that the image on the photoreceptive element surface may be force dried or allowed to dry at ambient conditions. Thus, Morrison does not teach or suggest an electrophotographic toner composition that does not form a film under Photoreceptor Image Formation conditions, as required in the present claims.

It is respectfully submitted that the above discussed references would not have individually or in combination suggested the toner compositions of the present claims. Further, the skilled artisan would have had no motivation to prepare a gel toner composition as presently

claimed, wherein a reversible gel having the present performance properties is formed through use acidic and basic functionality in an amount sufficient to provide a three dimensional gel of controlled rigidity. The references do not teach or suggest preparation of a gel toner composition that substantially does not form a film under Photoreceptor Image Formation conditions, as required in the present claims.

Finally, the skilled artisan could not have predicted that such toner compositions would exhibit superior performance properties, such as excellent image transfer from the photoreceptor, exceptional storage stability, and superior final image properties relative to erasure resistance and blocking resistance.

Claim Rejections – Double Patenting

Claims 1-26 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting over copending Application Nos. 10/612,182 and 10/612,444.

In order to overcome this provisional rejection and to expedite prosecution, a terminal disclaimer in view of copending Application Nos. 10/612,182 and 10/612,444 is enclosed without prejudice.

CONCLUSION

In view of the above remarks, it is respectfully submitted that the foregoing is fully responsive to the outstanding Office action. In the event that a phone conference between the Examiner and the Applicant's undersigned attorney would help resolve any issues in the application, the Examiner is invited to contact said attorney at (651) 275-9811.

Respectfully Submitted,

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By: _____

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